

**ASSESSMENT OF MINES FOR IMPORTANCE
TO BAT SPECIES OF CONCERN, SOUTHWESTERN MONTANA**

A Progress Report to:

**U.S. Geological Survey
Biological Resources Division
Midcontinent Ecological Science Center
4512 McMurry Avenue
Fort Collins, CO 80525-3400
Attn: Thomas J. O'Shea, Ph.D.**

Submitted by:

**H. Peter Feigley
Michelle Brown
Sam Martinez
Kate Schletz**

**Montana Natural Heritage Program
1515 East Sixth Avenue
P.O. Box 201800
Helena, MT 59620-1800
(406) 444-3009**

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ABSTRACT

A program to close abandoned mines on BLM lands in southwestern Montana is scheduled. Some of these mines may provide habitat for up to 15 species of bats, including six U.S. Fish and Wildlife Service designated Species of Concern (former category 2 species). The USGS Biological Resources Division provided funding to the Montana Natural Heritage Program to survey abandoned mines in southwest Montana for bat use. The objective of this study is to identify mines used by bats and evaluate a variety of external and internal variables that would enhance predictive capabilities for locating active roosts and hibernacula. The results of this study will assist in avoiding the elimination of habitat that may be important to bats.

Fieldwork was initiated on August 18, 1997 and continued through October 15, 1997. Eighty-six abandoned and inactive mines were visited. Sixty-eight mines had one or more openings that might be suitable for bats. Openings had completely collapsed or were backfilled at 18 mines. Eleven mines were rated as having high potential to provide bat habitat. Mines which appeared to have the best potential for current bat use included the Bluewing, Clipper, Hendricks, Huron/Cottontail, Keystone, Shoemaker, and an unnamed cluster of shafts near the Watseca mine. These mines were extensive with complex workings that may interconnect underground, facilitating air flow through the mine.

Mines in the Bannack mining district appeared to be the most stable and exhibit the greatest potential for internal surveys. These mines were mostly located in limestone substrate. Most mines in the Rochester mining district were situated in oxidized shists that were very friable and appeared to be quite unstable and unsuitable for internal surveys.

External monitoring for bat activity was conducted at 66 openings from 34 mines. Ultrasonic monitoring was conducted at 59 openings, while mist-netting was conducted at eight locations. Bat activity was documented at 24 mines. However, analysis of ultrasonic recordings is currently in progress, which may reveal more activity. Tentative bat species detected by ultrasonic methods include unidentified *Myotis* species, western long-footed myotis (*Myotis evotis*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), and possibly Townsend's big-eared bat (*Corynorhinus townsendii*). *Myotis ciliolabrum* and *M. evotis* were the only species captured in mist nets, with 17 and three captures, respectively. Most captures were of adult non-reproductive males, while only one adult non-reproductive female *M. ciliolabrum* and one juvenile male *M. ciliolabrum* were captured.

Development of a GIS database of mine locations and sampled openings is in progress. Field-survey data are being entered into appropriate data tables and linked to a master database obtained from the Montana Bureau of Mines and Geology.

**Assessment of Mines for Importance
to Bat Species of Concern, Southwestern Montana
Progress Report: August 18 - November 15, 1997**

INTRODUCTION

The Bureau of Land Management (BLM) has scheduled the closure of abandoned mines in southwest Montana. Some of these mines may provide habitat critical for hibernation, reproduction, and warm-season roosting for bats, including up to six U.S. Fish and Wildlife Service designated Species of Concern (former category 2 species). Bat Species of Concern that may occur in southwest Montana are *Myotis ciliolabrum*, *M. evotis*, *M. thysanodes*, *M. volans*, *M. yumanensis* and *Corynorhinus (Plecotus) townsendii*. The US Geological Survey (USGS), Biological Resources Division (BRD), has provided funding to the Montana Natural Heritage Program (MTNHP) to conduct a study of abandoned mines in southwest Montana. The study is aimed at identifying mines used by bats and evaluating a variety of external and internal variables that would enhance predictive capabilities for locating active roosts and hibernacula in a broader area. A GIS database of mine locations and surveyed mine openings will be developed. The results of this study will assist in avoiding the elimination of habitat that may be important to bats.

Field work on this project commenced in late August 1997 corresponding with the signing of a cooperative agreement between USGS and MTNHP. This report summarizes field work conducted during August 18 to October 16, 1997.

METHODS

Mine sites to be visited for this project were identified from several sources. The Dillon Resource Area (Dillon RA) of the BLM provided a list of 106 mine sites and the Headwaters Resource Area provided an additional six sites. The Ermont, Tidal Wave and Rochester mining districts were identified by the BLM (Dillon RA) as a priority due to the potential for future mine closures in these districts. Additionally, databases developed by the Montana Bureau of Mines and Geology¹ (MTBMG) and the state of Montana were queried for abandoned mines in southwest Montana. We focused on visiting mines listed by the BLM and other abandoned mines in the vicinity of those listed.

Because of the late startup date, our primary objective this field season was to identify abandoned mines on BLM lands having openings suitable for bat entry and external

¹ The database was developed as part of an inventory of abandoned and inactive mines on BLM lands in southwest Montana. (Marvin, R.K., Metesh, J.J., Hargrave, P.A., Lonn, J.D., Watson, J.E., Bowler, T.P., and Madison, J.P., 1997, Abandoned/Inactive Mines of Montana U.S. Bureau of Land Management, Montana Bureau of Mines and Geology No. 348, 513 p.)

monitoring, and evaluating the potential for human entry into the mines for internal survey. All mine openings that were approachable were examined for bat guano or other bat sign. External ultrasonic monitoring (Anabat units) and mist netting were conducted at, or near, selected mine openings that appeared to have potential for bat use.

Mines were evaluated for their current potential to serve as habitat for bats. This preliminary evaluation was based upon characteristics such as size of the opening, presence of obstructions (e.g., grates), detectable air flow, observable depth, presence of multiple openings that may be connected, and evidence of bat use (e.g., guano, insect parts). Categories of potential bat use were: none, low, moderate and high. The locations of mine openings were recorded on 7.5-minute topographic maps and/or recorded with GPS.

A geographic information system (GIS) is being used to manage locality data and to merge locality information with base-map layers of land ownership, elevation, roads, and hydrology. Survey data tables will be linked to the GIS.

RESULTS AND DISCUSSION

Mine Survey

Mines and mine openings

Eighty-six abandoned and inactive mines were visited during August 18 to October 17, 1997 (Table 1). Forty-nine of these mines were on the initial list provided by the Dillon Resource Area and 37 were additional mines (named and unnamed) in close proximity to the those mines on the BLM list. Mine openings (total = 166) that might be suitable for bats were found at 68 mines. Openings consisted mostly of adits, shafts and inclines. At least 32 of the visited mines had multiple openings.

Mines with no openings (total = 18) currently have no potential for bat use (Table 1). It is possible that mines with collapsed openings could re-open in the future, subsequent to continued movement of debris. Eleven mines were rated as having high potential to provide bat habitat. These mines usually had multiple openings and should be a priority for future external and internal surveys. Twenty-nine mines were rated as low-to-moderate or moderate for bat potential. Mines in this category often had only one or a few openings, most of which were partially or mostly collapsed, and/ or we were unable to determine the extent of the internal workings. Many mine openings were covered with grating (1"x3" openings) or metal cable netting (4" to 6" openings). These sites were usually ranked as low bat potential. However, at some sites there appeared to be adequate space around the edge of the grating to allow bat entry. In other instances wooden planking completely covered mine shafts, possibly precluding bat use.

Mines which appeared to have the best potential for current bat use included the Bluewing, Clipper, Hendricks, Huron/Cottontail, Keystone, Shoemaker, and an unnamed cluster of shafts near the Watseca mine. These mines were extensive with complex workings that may interconnect underground, facilitating air flow through the mine.

The locations of mines found in reports or databases were generally imprecise and given in Township, Range, Section and quarter-quarter-quarter section format. In areas with a high density of mines and mine openings, it was sometimes difficult to know for certain which mine was examined. We also identified discrepancies in land ownership indicated in databases and reports. In some instances, it was not clear if the land ownership at a mine was BLM, mixed BLM-private, or private. Time will be spent at the Montana Department of Environmental Quality (MT DEQ) during the up-coming months to sort out land ownership discrepancies to ensure that only mines on public lands are sampled.

Potential for human entry into mines

Many of the mine openings visited appeared to be unstable and potentially unsafe for human entry. Adits and shafts were often partially collapsed. Mine openings in the Rochester Mining District seemed to be more unstable than elsewhere. The surface rocks in this area consist mostly of oxidized shists that are very friable (primarily the Emma, Cooper, Shoemaker mines, and mines in the vicinity of the Watseca mine), while the Clipper mine was situated in gneiss rock and appeared to be somewhat more stable. Mines in the Bannack Mining District were often located in limestone substrate. Openings in this area appeared to be more stable and amenable to internal survey. The Bluewing, Huron/Cottontail, and Hendricks mines probably have the highest potential for internal surveys.

Human entry into abandoned mines will require very specialized training. We intend to meet this winter with personnel from the BLM, MT Bureau of Mines and MT Department of Environmental Quality to identify a team of specialists that is capable of evaluating mines for safe entry and conducting internal surveys.

External surveys

External monitoring for bat activity was conducted at 66 mine openings from 34 mines (Table 1). (Not all mine openings were monitored.) In all but three cases, monitoring was conducted to sample bat activity only at a specific mine opening. Mine openings were sampled for one night only, with the exception of the Kent-Bluewing and Ermont # 19 mines, which were sampled on two occasions (late August and late September). Ultrasonic monitoring occurred at 59 openings, while mist netting was conducted at eight locations. A cursory review of tape recordings from ultrasonic monitoring and the mist-netting documented bat activity at openings of at least 24 mines.

The analysis of tape recordings from ultrasonic surveys is in progress, with eleven tapes having been analyzed to-date. Tentative bat species detected by ultrasonic methods

include unidentified myotis species, western long-footed myotis (*Myotis evotis*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), and possibly Townsend's big-eared bat (*Corynorhinus townsendii*). Several bat calls were unidentifiable and were recorded as unknown species.

Mist netting at eight locations yielded 17 captures of *M. ciliolabrum* (captures = 14) and *M. evotis* (captures = 3). Non-reproductive adult males (12 *M. ciliolabrum* and three *M. evotis*) accounted for all but two captures. Other captures included one adult non-reproductive female and one juvenile male *M. ciliolabrum*. These limited results suggest that the sites sampled were most likely being used by groups of non-reproductive males as either day or night roosts.

Database Development

The MTBMG provided a copy of a database resulting from an inventory of abandoned and inactive mines on BLM lands in southwest Montana. This database contained the mine name, location, map coordinates, and general information regarding mine type and environmental hazards. The database contains a unique identification code for each mine. The MTBMG database and mine locations were imported into ArcView GIS. Other map layers available through the Natural Resource Information System (NRIS) and MTNHP include land ownership, hydrology, elevation and land cover. Mine sites that are currently not in the MTBMG database are being added to the database and assigned an identification code that indicates its appended status.

Data tables have been constructed to manage data on mine-opening characteristics (e.g., number of openings, size of opening, cover type, etc.), external survey data (i.e., Anabat or mist-net data) and survey weather conditions (temperature, humidity, wind, etc.). Data gathered during the past field season are being entered into the respective data tables. The mine identification code serves to link these data tables to MTBMG database.

UPCOMING WORK SCHEDULE

1. Continue assessment of data from the past field season.
 - a. Complete assessment of tape recordings from ultrasonic monitoring.
2. Review files on abandoned mines at MT Dept. of Environmental Quality (MT DEQ).
 - a. Seek information on the internal structure of abandoned mines in the study area.
 - b. Identify additional mines for evaluation
3. Formulate a list of potential sites for winter/early spring visits for internal survey.

4. Formulate a list of sites for external evaluation and external survey.
5. Identify a team of specialists capable of evaluating the safety of abandoned mines, entering mines and collecting appropriate internal habitat data.
 - a. Collaborate with BLM, MT DEQ, MTBMG.

Table 1. Summary of abandoned mines in southwest Montana examined for potential bat use, August 18 - October 17, 1997.

Mine Name	Openings (number)	Opening Type ¹	Date visited	Obstructions	Monitor Technique ²	Bat Potential
?? Unnamed collapsed timbered shaft	Y	S	10/5/97	Grate		Low
?? Unnamed diamond-shaped shaft	Y	S	10/5/97	Grate		Low
?? Unnamed inclined shaft in fenced enclosure	Y	S	10/5/97			Low - Mod.
?? Unnamed large open incline	Y	I	10/5/97			Low - Mod.
?? Unnamed open adit	Y	A	10/5/97			Low
?? Unnamed shaft in fenced enclosure	Y	S	10/5/97			Low
?? Unnamed shaft in fenced enclosure	Y	S	10/5/97			Low - Mod.
?? Unnamed timbered shaft	Y	S	10/5/97	Grate		Low - Mod.
?? Unnamed mill and fresh-water pond complex	N		10/5/97			Not Applicable
?? Unnamed shaft in fenced enclosure	Y	S	10/5/97			Low
?? Unnamed shafts - NORTH OF WATSECA	Y	S	10/5/97			Low - Mod.
AGNES LODGE	Y	A	8/25/97		Anabat	Low - Mod.
AJAX MINE	N	I/S (all collapsed)	10/16/97			None
AMERICAN FLAG MINE (EMPIRE MINE)	Y	A	9/15/97		Anabat	Low - Mod.
BADGER MINE	Y	S	8/19/97	Grate		Low
BEACON LIGHT	Y	A	9/6/97		Anabat	Low - Mod.
BLACK ACE	Y (2)	S	9/24/97		Anabat/ Net	Moderate
BLOWOUT MINE	1		9/7/97			Low
BLUE WING	Y (5+)	A/S/I	8/19/97		Anabat/ Net	High
BOAZ MINE	N		8/19/97			None
BON MINE	N		8/22/97			None
BONNIE GROUP	N		9/19/97			None
BRYZANT MINE	N		9/23/97			None
CARBONATE MINE	Y	S	8/18/97		Anabat	Moderate
CHAMPION	Y	S	9/6/97		Anabat	Moderate
CLIPPER MINE	Y (17)	S	10/5/97	Most grated		High
COMSTOCK MINE	N		8/18/97			None
COOPER	Y (2)	I	10/16/97			High
DEXTER MINE	Y	S	8/18/97	Grate	Anabat	Moderate
DICK AND BILLY JANE	Y (2)	S	9/6/97	Grates	Anabat	Low

¹ A = Adit, S = Shaft, I = Incline Shaft.

² Technique in **bold** indicates bats detected at one or more survey sites.

Mine Name	Openings (Y/N)	Opening Type	Date visited	Obstructions	Monitor Technique	Bat Potential
EMMA	Y (5)	I	10/15/97	Grates	Anabat	Moderate
ERMONT MILL TAILINGS	Y	S	8/18/97	Grate	Anabat	Low
ERMONT NO 19 MINE	Y (2)	S	8/18/97	Grate over one opening	Anabat/ Net	Moderate
ERMONT NO 2 MINE	N		8/18/97			None
FALCON PROSPECT	Y (2)	S	9/24/97		Anabat	Moderate
GALENA	N		8/18/97			None
GALENA MINE	Y	S	9/26/97			Modeate
GOLD KING (1)	Y (3)	A	10/16/97		Anabat	Moderate
GOLD SEAL CLAIMS	Y (2+)	S	9/7/97			Low
GOLDEN GATE MINING CO	N		8/19/97			None
GOLDEN ROD	Y (2)	A	10/5/97	Cable netting		High
GOODVIEW MINE	Y	S	8/18/97		Anabat	Moderate
HENDRICKS / GRAETER / APEX	Y (2)	A	8/23/97	One gated	Anabat/ Net	High
HURON/ COTTONTAIL	Y (10+)	A	8/21/97	Some open, others with grates or cable netting	Anabat/ Net	High
INGERSOL MINE	Y (2)	S	8/22/97	Grates		Low
JOKER MINE	N		8/18/97			None
KENT MINE	Y (2)	A	8/19/97		Anabat	Moderate
KEYSTONE	Y (5)	S/A	9/26/97	Some open, some with grates		High
LEONIE TUNNEL PROSPECT	Y	A	8/19/97	Grate	Anabat	Low
LITTLE HAWK MINE	N		8/25/97			None
LONE WOLF MINE	N		8/19/97			None
LONGFELLOW MINE	Y (?)	S	10/16/97			Low
MAIDEN ROCK MINE	Y	A	9/5/97		Anabat	Moderate
MAMMOTH AND STELLA MINES	N		9/25/97			None
MAYFLOWER	Y	I	8/25/97	Y		Low
MOHAWK MINE	Y (3)	S	9/25/97		Anabat	Moderate
MOUNTAIN CLIFF	Y (4+)	A	9/17/97	Gates on adits	Anabat	Moderate
NEZ PERCE NORTH	Y	I	10/17/97			Low
NICK PREEN MINES	Y	A	8/25/97		Anabat	Low
NORTH CENTRAL MINE	Y	A	9/5/97		Anabat	Low

Mine Name	Openings (Y/N)	Opening Type	Date visited	Obstructions	Monitor Technique	Bat Potential
PEARSON PROSPECT	Y (2)	A/S	9/25/97	Collapsed wood and tin in shaft	Anabat	Moderate
PLAINVIEW	Y (1)	A	9/23/97	Grate	Anabat	Low
POMEROY MINE	Y (3)	I	8/20/97	Grate over two openings	Anabat	High
RENA MINE	N		8/18/97			None
SHOEMAKER	Y (9)	A	10/1/97	Grate over one shaft	Anabat	High
SHORT SHIFT MINE	Y	S	10/5/97			High
SHORTFELLOW MINE	Y (4)	I	10/16/97	Two adjacent shafts covered with wooden planks		Low
SILVER NOTE	N		9/7/97			None
SILVER ROSE MINE	Y (3)	A/I	8/22/97	Grate over one incline; gate on adit		Moderate
SILVER STAR (LONE STAR) MINE	Y	A	10/1/97	Grate		None
STEVENSON MINE	N		8/26/97			None
STRAWBERRY-KEYSTONE MINE AND MILL	Y (6+)	A	9/16/97		Anabat	Moderate
TIDAL WAVE	Y (3)	A	9/24/97	Grate on adit, cable net over incline.	Anabat	Moderate
UNNAMED 02S06W10BCBB (added HPF)	Y	A	9/25/97	Gate	Anabat	Moderate
UNNAMED 02S07W32BCBC MINE	Y (2+)	S	9/6/97	Grates over shafts	Anabat	Moderate
UNNAMED 03S07W06DDDB MINES	Y	STOPE	10/16/97			Low
UNNAMED 03S07W06DDDA MINE	Y	I	10/16/97			Low
UNNAMED 03S07W06DDDD SHAFT CLUSTER	Y (3)	I	10/16/97			Low
UNNAMED 03S07W08CBCB MINES	N	Expl. Pits, collapsed	10/15/97			None
UNNAMED 03S07W20 DADD (added HPF)	Y	S - partially or completely collapsed	10/17/97			Low
UNNAMED 06S11W35BABB SHAFT (added HPF)	Y (2)	A/S	9/30/97	Shaft has tight wooden cover		Moderate
UNNAMED GOLD, BISMUTH	N		8/21/97			None
UNNAMED SHAFT AND PROSPECTS (Near Watseca)	Y (2+)	S	9/7/97			High
WALKER MINE	Y (3)	A/I	9/24/97	Two adits have grates	Anabat	Low
WATSECA MINE AND MILL	Y (2+)	S	9/6/97		Anabat	Moderate
WEST ERMONT MINE	Y	S	8/18/97		Anabat	Low
WICKIUP #1	Y	A - partially collapsed	10/5/97			Low

Table 2. Summary of mist-netting results at 5 mines in southwest Montana, August 18 - September 24, 1997.

Mine	Site	Date	Species	Sex	Age	Reproductive Status
Ermont # 19	B (Partially collapsed adit)	8/18/97	Myotis ciliolabrum	Female	Adult	non-reproductive
			M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
Kent/ Bluewing	C	9/29/97	No Captures			
		8/19/97	No captures			
		8/19/97	M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Adult	non-scrotal
Huron/ Cottontail	C		M. evotis	Male	Adult	non-scrotal
		9/30/97	No Captures			
		9/30/97	No Captures			
		8/20/97	M. ciliolabrum	Male	Adult	non-scrotal
			M. evotis	Male	Adult	scrotal
			M. evotis	Male	Adult	non-scrotal
Hendricks	D/E (nets between adjacent shafts)	8/20/97	M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	Juvenile	non-scrotal
		8/21/97	M. ciliolabrum	Male	Adult	non-scrotal
			M. ciliolabrum	Male	?? (escaped)	non-scrotal
Black Ace		9/24/97	No Captures (windy)			